

ABSTRACT

A contrast improving sheet to be disposed on the viewing side of a display, such as a rear projection display or a liquid crystal display, to display images in high contrast and in excellent directivity, and a rear projection screen provided with the contrast improving sheet are provided. A contrast improving sheet 11 includes a first optical functional element 1 and a second optical functional element 2 disposed on the viewing side of the first optical functional element 1. The first optical functional element 1 is provided with a plurality of protrusions 3 arranged in a direction or distributed in a plane. Each of the protrusions 3 has a pair of opposite total-reflection facets 5 for totally reflecting image light rays substantially perpendicularly incident on the entrance surface and a flat facet 6 extending between the front edges, on the side of the exit surface, of the pair of opposite total-reflection facets 5. Light absorbing layers 7 are formed in V-grooves between the adjacent protrusions 3. The second optical functional element 2 is provided with a light path correcting layer 9 for correcting light paths followed by the image light rays totally reflected by the total-reflection facets 5 of the protrusions 3 such that the image light rays are emitted through the exit surface substantially perpendicularly to the exit surface. The light path correcting layer 9 has a plurality of inclined planes 8 inclined in opposite directions, respectively, and the inclined planes 8 inclined in opposite directions are arranged alternately.

Images

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(54) CONTRAST IMPROVING SHEET AND REAR PROJECTION SCREEN
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Abstract

(57) A contrast improving sheet disposed on the observation-side front surface of a display device, such as a rear projection display or a liquid crystal display, high in contrast and superior in directivity; and a rear projection screen having the same. A contrast improving sheet (11) is provided with a first optical element (1) and a second optical element (2) disposed on the observation side of the first optical element (1). The first optical element (1) has a plurality of ribs (3) arranged in one direction or planarly. Each rib (3) has a pair of mutually opposed total reflection surfaces (5) for totally reflecting image light (4) which substantially vertically falls thereon from the back side, and a flat surface (6) formed to connect these opposed total reflection surfaces (5) on the light outgoing side. Further, a light absorption layer (7) is formed in the V-shaped groove between ribs (3). The second optical element (2) has an optical path correcting layer (9) for correcting the optical path of image light totally reflected by the total reflection surface of each rib of the first optical element (1) so as to cause the image light to go out substantially perpendicularly to the observation side. The optical path correcting layer (9) has a plurality of inclined surfaces (8) disposed in zigzags in order to cause the image light (4) which is totally reflected by the total reflection surface (5) of each rib (3) of the first optical element (1) to go out substantially perpendicularly.

